A REVISION OF THE DACETINE ANT GENUS ORECTOGNATHUS.

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Two closely related genera, *Orectognathus* Fred. Smith and *Arnoldidris* Brown, make up the subtribe Orectognathiti of the tribe Dacetini, subfamily Myrmicinae of the Formicidae.

In the revisionary matter which follows deposition of specimens is indicated by the following abbreviations: Australian Museum, Sydney [AM]; British Museum (Natural History), London [BMNH]; collection of John Clark, Melbourne [Coll. Clark]; collection of Carlo Emery, Museo Civico di Storia Naturale, Genoa [Coll. Emery]; collection of Auguste Forel, Museum d'Histoire Naturelle, Geneva [Coll. Forel]; Hungarian National Museum, Budapest [HNM]; collection of J. J. McAreavey, Melbourne [Coll. McAreavey]; collection of E. Mjöberg, Stockholm Museum [Coll. Mjöberg]; Museum of Comparative Zoology, Harvard University [MCZ]; Queensland Museum, Brisbane [QM]; South Australian Museum, Adelaide [SAM]; United States National Museum, Washington [USNM]; Western Australian Museum, Perth [WAM].

Mr. John Clark furnished much of the undetermined material on which this study is based, and aided with much valuable historical information and advice. He also allowed me access to some of Forel's type material in his possession. The specimens are indicated by asterisks. Forel retained some of the specimens he described from Mjöberg's and other collections, and sent some of the types to Prof. Sjöstedt, who in turn sent some to Mr. Clark. Material was also furnished by Mr. H. Womersley [SAM], Mr. K. McKeown [AM], Mr. R. B. Benson [BMNH], Mr. G. Mack [QM], and Dr. J. C. Bequaert [MCZ], and Father J. J. McAreavey. Mr. Tom Greaves of the Division of Entomology, C.S.I.R.O., supplied information on the type localities for *Orectognathus mjöbergi* and *O. sexspinosus*.

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With the descriptions are included certain measurements and proportions which I consider necessary standards in the proper characterization of dacetine ants. The symbols and their meanings, stated below in abbreviated form, are explained in Brown (1949), and more fully in my study of *Smithistruma* and related genera (in press) :—

HL. Length of head, dorsal view, maximum observable distance between a line connecting the posterior extremities of the occipital lobes (including teeth if present) and the parallel connecting the anterior extremities of the clypeal border.

ML. Exposed length of closed mandibles, measured from the apical point to the line connecting the anterior extremities of the clypeal border. The viewing plane must not be altered from that in which HL is observed.

WL. Weber's diagonal length of alitrunk, measured in lateral view along a line connecting the antero-dorsal pronotal margin (or place where pronotum joins cervix) and the apices of the inferior lobes or flanges of the sides of the propodeal declivity.

TL. Total length, HL + ML + WL + visible (lateral view) axial lengths of petiole, postpetiole and gaster, excluding sting, each rigid unit measured separately. If the occipital lobes surpass the pronotal margin, the amount of overlap is deducted. This length is the only one that can be used as a standard. Measurements of previous authors are neither comparable with TL nor among themselves.

CI. Cephalic index, or maximum measurable width of head (excluding occipital teeth if present) expressed as a percentage of HL.

MI. Mandibulo-cephalic index, ML expressed as a percentage of HL.

Measurements of scape length and petiole length are the observed maxima. All measurements are stated in millimetres. Repeated checks on specimens belonging to this subtribe have shown that error of measurement normally does not exceed the following limits : HL and ML, $\pm$ ·01 ; WL, $\pm$ ·02 ; TL, $\pm$ ·05. Errors in the indices usually are about ± 1.

Subtribe **ORECTOGNATHITI.**

Worker.—Size medium, length between 4 and 8 mm. Monomorphic or polymorphic. Head of the primitive "strumigeniform" tribal shape, with well developed occipital lobes and strongly narrowed anterior portion, the whole more or less depressed. Vertex raised, medially sulcate ; occipital lobes depressed or concave : clypeus medially concave. Frontal carinae produced backwards as distinct, though posteriorly weak ridges bordering the shallow, poorly defined antennal scrobes dorso-medially. Eyes large, placed laterally in the scrobal region near or before mid-length of the head, fully exposed to dorsal view. Mandibles elongate, linear, somewhat depressed, approximately parallel at full closure ; inner borders each with strong acute basal tooth or spine, directed obliquely mesad and posteriorly, largely concealed beneath the clypeus.

at full closure ; apical armature consisting of three strong, incurved, more or less spiniform teeth of which the ventral pair are conjoined to form a short fork ; dorsal-most tooth longer. Antennae distinctive, long and slender, with scape usually gently incrassate in apical half ; funiculus with four segments, all longer than broad, second longest, apical segment incrassate.

Under-mouthparts (not investigated in *Arnoldidris*) closely retractile into mouth cavity ; palpi slender, maxillary with five and labial with three segments. Labrum a short, broadly transverse plate with deep median cavity to receive basal mandibular teeth ; laterally with a narrow, carinate lobe fitting into the ventral cavity of the closed mandible between basal tooth and condyle and bearing an attenuated, anteriorly directed trigger hair. Labrum covering less than half of mouth cavity when closed down, apex broadly excised or emarginate.

Alitrunk variable, but with long, acute, divergent propodeal spines, not subtended by infradental lamellae. Petiole very elongate, slender, with a gradually tapering peduncle, with or without a distinct node. Postpetiole simple, convex above, constricted off rather strongly from adjacent segments. Gaster short, broadly oval, the first (basal) segment making up the great part of its bulk ; apical segments crowded, somewhat ventrally directed. Sting well-developed. Legs long and slender, but with more or less incrassate femora and tibiae.

Primitive sculpture when developed, consisting of dense, coarse umbilicate-foveolation of head, alitrunk and nodes ; gaster usually smooth, shining, rarely very finely and superficially sculptured. In *Arnoldidris* and one species of *Orectognathus*, the foveolation gives way dorsally to a surface largely smooth and shining. Pilosity usually almost obsolete, especially on dorsal surfaces of head and alitrunk ; rarely with fairly abundant short, fine, erect hairs. Most species with a few, long, erect hairs along the inner mandibular borders and near the gastric apex, with sparsely distributed adpressed microscopic pubescence on the appendages, ventral surface of head, and to a lesser extent on the gastric dorsum. Colour ferrugineous in varying degree, often with a broad pattern of deep infuscation.

Female and male known only for *Orectognathus*.

Distribution.—The subtribe is restricted to Eastern Australia, Tasmania, New Guinea, New Caledonia, New Zealand and islands adjacent to these areas. Thirteen species are recognised and these are divided into two genera of which one, *Arnoldidris*, is known only from New Guinea and its coastal islands. It is possible that additional species will be collected in Queensland, New Guinea and the Solomon Islands.

Knowledge of the biology of the subtribe is limited, but one species is known to be a collembolan-feeder. This habit is widespread among the genera of the related subtribes Strumigeniti and Epopostrumiti, so it would not be surprising if it were basic to the ethology of the Orectognathiti. The orectognathite species apparently form very small colonies and inhabit rotten wood and the soil under stones.

The Orectognathiti are related to the primitive dacetine genera *Daceton* Perty and *Acanthognathus* Mayr. Santschi (*see* Smith, 1944) remarked on this, and compared and figured the antennae of *Acanthognathus* and *Orectognathus*. The polymorphism, shown by *Orectognathus versicolor* and *O. clarki*, is similar in many respects to that of *Daceton*. It also appears in some primitive members of the other two subtribes, and must represent a very ancient condition. In most dacetine species, a very narrow monomorphism exists, with the worker and female castes differing but little in size and proportions. Apparently this monomorphism has been attained independently in each of the four subtribes in conjunction with increasing specialization for a cryptobiotic existence.

KEY TO THE GENERA OF THE ORECTOGNATHITI, BASED ON THE WORKERS.

Promesonotum continuously convex, completely unarmed, the humeri gently rounded; petiole extremely long, the node not discernible in lateral view.....*Arnoldidris* Brown.

Pronotum depressed and horizontal, with distinctly dentiform or spinose humeri; mesonotum suddenly raised and armed with one or two pairs of tubercles, welts or small teeth; petiole usually shorter, with a distinct node discernible in lateral view....*Orectognathus* Fred. Smith.

ARNOLDIDRIS Brown.

Arnoldidris Brown, 1950, Trans. Amer. Ento. Soc., 76, pp. 143–5.

GENOTYPE.—*Orectognathus chyzeri* Emery.

The original diagnosis is accompanied by a key and synonymic references to the four species; *A. biroi* (Szabó), *A. chyzeri* (Emery), *A. horvathi* (Szabó), and *A. longispinosus* (Donisthorpe). The diagnosis must now be narrowed, due to the discovery of *Orectognathus satan* sp. nov. which has occipital teeth and extremely elongate propodeal spines. The structural differences in the pronotum, mesonotum and petiole, listed as characters (1) and (2) in the original paper, are the outstanding features of the genus and are quite satisfactory for the purpose of separating it from *Orectognathus*.

A brief examination of the holotype of *A. longispinosus* in the British Museum showed it was originally incorrectly described by Donisthorpe. Instead of the sharp teeth which Donisthorpe described as present on the occipital extremities, I found I found only bluntly angulate occipital corners similar to those described and figured by Emery for *A. chyzeri* and by Szabó for *A. biroi*.

A. longispinosus possibly may be synonymous with one of these species. The type needs thorough study before a decision is made. My key should be modified by shifting *A. longispinosus* from couplet 2 to couplet 3. Colour may be used as a further separatory character until a proper study can be made of the species in couplet 3.

ORECTOGNATHUS Fred. Smith.

Orectognathus Fred. Smith, 1853, Trans. Ento. Soc. Lond. (Ser. 2). 2. p. 227.

Orectognathus Emery, 1922, Genera Insectorum, Fasc. 174, p. 318, partim.

GENOTYPE.—*Orectognathus antennatus* Fred. Smith, monobasic.

WORKER.—Monomorphic or polymorphic, with characters of the subtribe plus those given in the key. Additional characters which may have one or more exceptions among the species: Frontal carinae each with a short, flat anteocular tooth. Mandibles often with the inner margins each produced as a narrow, translucent cultrate lamella, usually more or less expanded to form a low subapical flange or low tooth; beyond this, the inner border falls away rapidly, forming a preapical concavity. Petiolar node mostly with a pair of short conical teeth placed bilaterally

at the summit ; the teeth variable in development, even within single nest series. Head, alitrunk and nodes densely covered with distinct, circular umbilicate foveolae ; gaster largely or entirely smooth, shining. Pilosity as for subtribe.

Pupae of worker (and female) with mandibles widely open and a pair of large, elongate sac-like lobes extending forward between them.

Female.—Similar in size to the largest workers, to which caste it is sometimes connected by a series of intermediate forms, including wingless ergatoids. Mandibles usually slightly shorter and head very slightly broader than in workers of the same head length. The female characters are those common to most dacetines, very large compound eyes, small ocelli, thoracic sclerites developed, petiole, postpetiole and gaster relatively broader and more bulky than in the worker. The spines and teeth on head and alitrunk less well developed than in the worker, but sometimes the reverse is true of the petiolar teeth. A study of the ergatoid forms shows that the narrowly rounded and laterally projecting prescutellar lobes of the female are homologues of the posterior pair of mesonotal teeth or tubercles of the worker. Wings (known only for *O. versicolor*) clear, venation as in the males ; posterior wings with six subapical hamuli. Prescutum with a distinct median carinula.

Male.—(Known for *O. antennatus*, *O. clarki*, *O. sarasini*, and *O. sexspinosus*). Body slender ; size, except for very small head and mandibles, much as in worker and female. Head rounded above, narrow behind ; with cervical border and eyes, as broad as than long or broader. Clypeus produced as a short, transverse apron, with subangulate anterolateral corners and a feeble median emargination. Eyes very large, oval, swollen-convex, protruding anteriorly as well as laterally ; placed anteriorly and occupying about half of the sides of the head. Cervical border produced as a distinct, slightly reflexed collar (*O. antennatus*, *O. clarki*) ; bidentate (Forel) in (*O. sexspinosus*). Ocelli well developed. Mandibles extremely reduced, even for a dacetine, just visible in dorsal view when closed ; triangular, without differentiated inner margins, bluntly pointed, half or less than half as long as the distance between their apices when fully closed ; insertions close to the eyes. Under-mouthparts pale yellowish, largely exposed and projecting ; palpi well developed and segmented as in the worker.

Alitrunk as in the female, but pronotum unarmed ; notauli complete, forming a deep Y ; parapsidal furrows moderately distinct ; median longitudinal carina of prescutum distinct. Propodeal teeth reduced to laterally compressed, rectangular or subacute angles, often continued ventrally as a carina on each side of the declivity. Petiole long, slender, with a distinct but very gradually rising, low convex node, unarmed at summit. Postpetiole elongate, subfusiform, convex above. Gaster long, slender, apex forming a long, blunt point and slightly arched ventrad. Genitalia (*O. antennatus*, *O. clarki*) exposed, but enfolded in the parameres ; the latter seen in dorsal view broad, with convex lateral outlines and rounded apices ; each with a concave mesial outline ending mesosubapically in a blunt angle, the angles of the opposite members normally opposed. Volsellae broad, very similar in the species seen. Penicilli (cerci) short and stout.

Head, alitrunk and nodes (except dorsal surfaces of last) rugulo-granulose, with scattered foveolation ; dorsal surfaces of nodes feebly sculptured, weakly shining ; gaster feebly sculptured if at all, weakly shining. General pilosity consisting of fine short, subadpressed or erect hairs, only moderately abundant and conspicuous. Colour largely black or blackish-brown, but the appendages and mandibles lighter, more yellowish.

Wings clear, with delicate but distinct, yellowish venation of the *Solenopsis* kind ; Mf4 reduced to a spur continued as an unpigmented furrow ; Rs not quite reaching apical border of wing (radial cell open). Posterior wing narrow, with a broad posterior fringe of microtrichiae ; broadly extended X-like venation in basocostal quadrant ; four or five subapical hamuli.

DISTRIBUTION.—Of the nine species, *O. csikii* is found in Eastern New Guinea, *O. sarasini* in New Caledonia and *O. howensis* on Lord Howe Island in the Tasman Sea. The other six are confined to Australia, Tasmania and New Zealand. The species known from New Zealand, *O. antennatus*, may be a tramp there, but it is certainly native to S. E. Australia. The hardiest species, *O. clarki*, ranges from Tasmania, where it is the only known member of the genus, to S. E. Queensland, and populates medium-dry sclerophyll forest in Victoria as far west as the Otway Peninsula. Another species, *O. versicolor*, ranges south along the east coast from near Brisbane into New South Wales, and may reach the extreme eastern tip of Victoria. These three species are characteristic of the warm temperate forest regions. The three remaining species are known only from isolated patches of tropical and subtropical rain forest extending through eastern Queensland from near the New South Wales border to the Cairns-Cooktown district. *O. mjöbergi* is known from several of these patches both in the north and south, and may be found in many of them when collecting is extended. *O. sexspinosus* and *O. satan* are known only from the north.

The greatest density in distribution occurs within 150 miles of Cape Byron, New South Wales ; four species are known to occur in this region. *O. howensis*, found on Lord Howe Island, only about 500 miles off Cape Byron, may well occur on the mainland. Many Lord Howe species are certainly recent introductions from the east coast of Australia. While it is possible that additional species may be found in New Guinea and the Solomons, it seems fairly safe to argue an Australasian, probably Australian, origin for *Orectognathus*, and a differentiation within its present range. *Arnoldidris* probably arose directly from *Orectognathus* in the Papuan subregion.

Orectognathus forms small colonies usually of less than 60 workers and one to three dealate females. The temperate forest species prefer nest sites in the soil under or beside stones, while the rain forest forms are found in rotten logs. Development, at least in the temperate areas, is slow and here sexual forms are produced during midsummer. The data, admittedly meagre, suggest that unisexuality is common in the genus.

One of the major purposes of the Australian project was the investigation of the feeding habits of *Orectognathus* and of the subtribe Epopostrumiti in order to understand better the origin and development of the interesting recently discovered habit of the widespread Strumigeniti of predation upon Collembola. It was totally unexpected that *Orectognathus* would have feeding habits similar to those of *Strumigenys* because of the disparity in size and other characteristics. Nevertheless, *O. clarki* was found to be quite definitely a collembolan predator, and the Epopstrumiti were found to have the same habit. It appears certain that Collembola form the basic diet for the three higher subtribes of Dacetini. For this reason it is desirable that the food habits of the very primitive genera *Daceton* and *Acanthognathus*, of the Neotropical area, should be ascertained.

Taxonomically, *Orectognathus* presents relatively few difficulties when the variation and polymorphism of species are properly surveyed. Due to fortunate travel opportunities, types or reliable examples of all the Australian species have been examined in Australian, English and American collections, and the extra-Australian species are regarded as distinct on the basis of published evidence.

Additional material may force revision of the status of *O. sarasini* and *O. howensis*, which are not well known. Two new species are described, but no geographical races can be recognised in the present material.

ORECTOGNATHUS VERSICOLOR Donisthorpe.

Figures 1a, 2a, 2b.

Orectognathus versicolor Donisthorpe, 1940, Ann. Mag. Nat. Hist., Ser. 2, 5, pp. 46–47.

Despite Wheeler's (1927) warning that the Australian fauna contained undescribed polymorphic forms of *Orectognathus*, Donisthorpe described this species from a single worker. The description is short and contains few details not common to all species of the genus. It could apply to *O. versicolor*, *O. clarki*, and *O. mjöbergi* as delineated in this paper. Furthermore, an examination of the remains of the type in the British Museum shows that the description is partly erroneous.

The type is virtually worthless for the purpose of fixing the name to the species, since the head has been lost since 1940. Close comparison of the remains convinces me that the specimen is a small worker that could belong to either of two species as treated here, *O. versicolor* or *O. clarki*. Without the head, it is impossible to assign the name more accurately ; both species occur in S. E. Queensland. Since I have a series of the dimorphic species from the type locality (Tamborine Mt., Queensland) of *O. versicolor*, and since *O. clarki* is probably rare in this region, I have arbitrarily fixed the name *versicolor* to the group to which this series belongs. I anticipate no difficulty in following this course, and if the dimorphic topotypes are considered to belong to this species by subsequent workers, much confusion will be avoided. I do not agree that the practice of creating neotypes is anything but a further source of confusion.

Measurements of female castes :—

Caste.	No. of Specimens.	HL.	ML.	TL.	WL.	CI.	MI.
Soldier	15	1·76–2·02	0·80–0·88	6·48–7·35	—1·80	89–97	47–42
"Media"	3	1·60–1·66	0·83–0·84	5·80–6·16	..	88–89	53–49
Worker	29	1·03–1·53	0·66–0·82	4·53–5·75	1·02—	79–87	64–52
Female	7	1·55–1·64	0·80–0·86	6·67–7·01	—1·74	88–93	53–47

The relationship of head length to head width is plotted on the graph (fig. 1a). The figures and the graph show that, unless there has been a strong selection of large and small individuals in all five samples, *O. versicolor* is a strongly dimorphic

species. The " media " workers are limited arbitrarily, and the three specimens in this category are from different nests. It seems to be no coincidence that the female cephalic and mandibulo-cephalic dimensions and proportions are close to those of

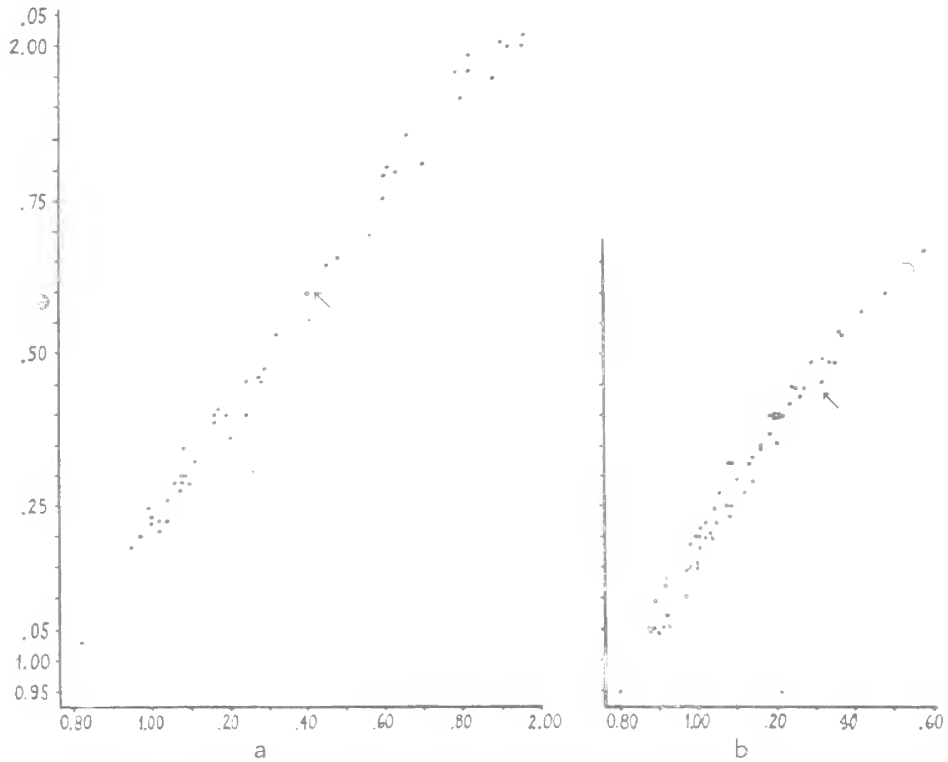

Figure 1. Graphs showing relationship of head length (ordinate) to head width (abscissae). a. *Orectognathus versicolor* Donisthorpe, based on 47 soldiers and workers from 5 nests. b. *Orectognathus clarki* sp. nov., based on 63 workers from 8 nests. The figures are measurements in millimetres. Arrows indicate approximate centres of concentration of females along curve on the basis of the same measurements.

the " medias." The largest " media " and the largest female are separated from the smallest soldier by a significant gap in HL and an apparent gap in form and proportions of the mandibles. The " medias " are probably only larger workers. This polymorphism is of a different sort from that in the closely related *O. clarki*, as a comparison of the two graphs will show. The soldier of *O. versicolor* with its huge head and massive jaws has no counterpart in any other orectognathite species.

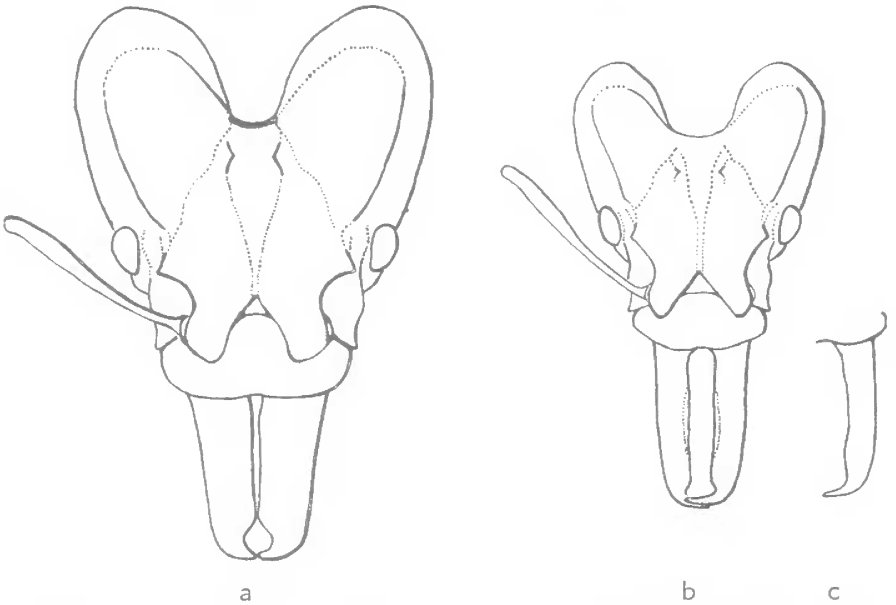

Figure 2 a-b. *Orectognathus versicolor* Donisthorpe. a. Soldier, dorsal view of head and mandibles. b. Worker (minor), dorsal view of head and mandibles.

Figure 2c. *Orectognathus clarki* sp. nov. Worker, dorsal view of left mandible.

Soldier.—Head massive, strongly modelled; the dorsal surfaces of the occipital lobes deeply concave anteriorly and centrally; the concavity bounded posteriorly and laterally by a distinct carinula. Vertex raised and convex; split longitudinally by a broad and rather deep median sulcus; posteriorly with two fine carinulae, adjacent to the sulcus and appearing like low teeth in dorsal view. Anteocular teeth developed, rectangular or acute, more or less raised. Clypeus transverse, deeply concave, anterior border weakly emarginate in the centre. Mandibles broad and massive, up to slightly more than one-third as broad as long; apical teeth short, thick and blunt, preapical excision abrupt; remainder of inner mandibular border straight or feebly convex. Antennae slender, relatively short, failing to reach the occipital extremities by a distance equal to about one-third of their length.

Pronotum flat, anteriorly rounded, with raised margins; humeral teeth long, acute, with broad bases, flattened and with their tips bent slightly anterodorsad. Promesonotal suture absent; mesonotum suddenly and strongly elevated, the elevation consisting chiefly of two pairs of prominent blunt tubercles, of which the posterior pair (=prescutellar lobes) is longer, farther apart and more nearly dentiform. Propodeum weakly convex, lower than, and separated by a distinct metanotal suture from the mesonotum. Propodeal declivity weakly concave, subequal in length to the dorsum; propodeal teeth long and slender, about twice as long as distance between centres of their bases, straight or feebly curved and often with weakly deflected apices, diverging at an average angle of about 40° and elevated about 45° from the plane of the propodeal dorsum.

Petiole with slender, anteriorly tapering peduncle, slightly longer than the low, gradually convex node, with a low, blunt denticle on each side of the summit; posterodorsal nodal face concave. Postpetiole convex, approximately as broad as long, in dorsal view appearing truncate behind. Gaster broadly oval, compact, much narrower than head.

Head, alitrunk and both nodes with dense, distinct foveolation ; the foveolae on the cephalic dorsum separated by narrow longitudinal rugulation, and with their bottoms more or less shining ; those on alitrunk and nodes largely separated by narrow areas with subopaque coriaceous sculpture. Apical surfaces of occipital lobes, much of ventral surface of head, centre of pronotum, propodeal declivity and apical halves of mandibles nearly or quite smooth, shining. Basal portions of mandibles, antennae, and most of legs finely coriaceo-punctulate, feebly shining ; gaster smooth and shining, sometimes with extremely short, feeble, basidorsal, longitudinal striolation.

Pilosity absent, except for a sparse vestiture of very fine, short, adpressed hairs on mandibles, antennae, legs, ventral surface of head and very indistinctly on gastric dorsum ; a few long, fine, erect hairs on the ventral sides of the mandibles toward the apices and about the gastric apex. Trigger hairs of labrum fine, diverging, about two-thirds the length of the mandibles.

Colour variable, apparently subject to rapid fading in the cabinet. The freshest specimens with the dorsal surface of the head (except occipital lobes), alitrunk, nodes, and a broad transverse band across the first gastric tergite, deep blackish-mahogany, mandibles, occipital lobes and underside of head, antennae, legs and most of gaster yellowish-ferrugineous.

Worker ("media" and "minor").—Like the soldier, but smaller, more slender, and with head and mandibles like those of *O. clarki*, *O. mjöbergi*. Relief of cephalic dorsum less bold than in the soldier ; anteocular tooth raised and distinct, rectangular or feebly acute, but usually not so acute as in the soldier. Inner mandibular border with a slight concavity filled by a very narrow, medially straight-edged and cultrate dorsal lamellate strip, approximately straight for the basal two-thirds of its length, beyond which it falls off much less abruptly to the apical teeth than in the soldier. MI increases in inverse proportion to HL and CI decreases (this is also the case with the soldiers). An increase in MI is also associated with greater narrowing of the shafts of the mandibles. The apical teeth slender, spiniform, the dorsal tooth, about twice as long as the ventral pair. Antennal scapes reaching to within about one-sixth of their lengths of the occipital extremities. Preoctal spines long and slender, length about twice the distance between the centres of their bases. Colour variable ; lighter and with less contrast between light and dark areas than in the soldier.

Female.—Mandibles intermediate in form and proportions between those of soldier and worker, somewhat as in *Pheidole* and other dimorphic myrmicine genera with an "intermediate" queen. Mesonotum unarmed, anteriorly with a distinct, low, median, longitudinal carina, posteriorly feebly sulcate. Scutellum convex. Mesothorax densely foveolate dorsally, with a few longitudinal costulae posteriorly on the scutum ; meso- and metapleurae in large part smooth and shining. Colour as in soldiers of the same colony.

Male.—Unknown.

Distribution.—Holotype, Tamborine Mountain, S. E. Queensland (R. E. Turner) [BMNH]. Six additional colony-series were studied. Queensland : Tamborine Mt. (A. M. Lea) ; Obi Obi River, Blackall Range (W. L. Brown). New South Wales : Springwood (R. Pullen) ; Otford (A. M. Lea) ; Kiama (J. J. McAreavey) ; National Park (W. M. Wheeler). Deposition in [MCZ], [USNM] and all Australian collections named.

All localities are in the moist temperate areas along the eastern Australian coast. At Obi Obi River the ant was found in rain forest under a stone, and Pullen noted that the Springwood nest was under a rock in a somewhat damp situation,

so it is probable that this is the usual site preferred by the species. The series seen indicate that the colonies are rather small, with soldiers in the proportion of about one to every two workers, but it must be remembered that the soldiers represent more conspicuous objects to the collector than the workers.

The soldier and female castes are not likely to be confused with any other species, and the worker, while very similar to that of *O. clarki*, may be readily distinguished by its straight inner mandibular border.

ORECTOGNATHUS CLARKI sp. nov.

Figures 1b, 2c.

Worker.—Holotype: HL, 1·28; ML, 0·71; TL, 5·37; WL, 1·26; petiole, full length from dorsal view, 0·66; exposed length of antennal scape, 0·82; CI, 89; MI, 55. Paratypes (62): HL, 0·96–1·63; ML, 0·54–0·84; TL, 4·00–6·34; CI, 81–95; MI, 49–61.

Unimodally polymorphic, without division into worker and soldier castes. The workers show approximately the same range of variation in dimensions and proportions of head and mandibles as in the range worker–plus–"media" of *O. versicolor*. Largest workers sometimes with slightly larger heads than those of the accompanying females.

The workers are very similar to those of *O. versicolor* of the same size, except for slight differences in the form of the mandibles. The inner mandibular border is slightly concave in its basal two-thirds. This causes a very low, solid subapical convexity to come into relief and as the external mandibular border may be feebly convex the mandibles appear slightly arcuate.

The colour of many specimens is nearly uniformly ferrugineous throughout, with the exception of an infuscate band across the gastric dorsum present in most of them; similar to light-coloured workers of *O. versicolor*. There is a marked tendency to fade in the cabinet.

Female.—Eight specimens. ML, 0·64–0·76; TL, 5·40–6·62; WL, 1·30–1·61; CI, 88–92; MI, 50–56.

Head and mandibles as in large workers of the species, otherwise similar to female of *O. versicolor*, but lighter in colour, the anterodorsal part of the alitrunk usually ferrugineous; some specimens concolorous yellowish-ferrugineous except for gastric band.

An apparent ergatoid (Woori Yallock) has very minute underdeveloped ocelli and thoracic segments, and does not appear to have had wings. Inner mandibular borders only very feebly concave. The gaster similar to that of the worker in size, the prescutellar lobes raised, somewhat tuberculiform. Colour ferrugineous, with faint gastric band.

Male.—HL, 0·63; TL, 4·17; head width including eyes, 0·76; WL, 1·16; forewing length, *ca.* 2.9.

Collar of cephalic border narrow. Mandibles extremely reduced, scarcely visible in dorsal view. Antennae more robust than in male of *O. antennatus*; third to twelfth segments two to three times as long as broad; apical segment incrassate, length (*ca.* 0·38) about twice that of scape, shorter than in *O. antennatus*; length of scape about twice its thickness.

Sculpture lighter than in *O. antennatus*, the foveolo-punctation much weaker on the nodal surfaces and absent on the gastric dorsum; the latter very feebly coriaceous anteriorly, distinctly shining. Pilosity of head shorter and sparser, not so conspicuous, and not "woolly" in appearance. Colour as in *O. antennatus*; wings and volsella also very similar.

DISTRIBUTION.—Holotype, Ferntree Gully, Victoria, taken from a colony under a stone, in a patch of scrubby, grass-floored forest between Upper Ferntree Gully Station and the entrance to the public park (W. L. Brown) [Coll. Clark.] Other material was studied from eighteen nest series. Victoria: Ferntree Gully, 7 nest series (J. Clark, F. P. Spry, W. L. Brown); Summit of Mt. Dandenong, 2,000 feet (W. L. Brown); One Tree Hill, Dandenong Ranges, 1,600 feet (W. L. Brown); Airey's Inlet, Otway Peninsula (J. J. McAreavey); Millgrove (J. E. Dixon); Woori Yallock (L. B. Thorn). Tasmania: Hobart (A. M. Lea); Trevallyn (V. V. Hickman); Launceston (C. E. Cole). New South Wales: Dorrigo (W. Heron). Queensland: Toowoomba (E. J. Dumigan). Deposition of paratypes will be made in practically all the collections mentioned in the introduction.

This is the most commonly collected species of the genus, and the only one known to occur in Tasmania. The series from Dorrigo, N.S.W., consisting of twelve workers, is of interest as the only possible exception to the unimodal polymorphism usual for the species. Three of these workers, represented by the uppermost dots on the graph (fig. 1b), have broader heads than any other specimens seen. CI of these larger workers is 92–95 as against 83–88 for the nine smaller individuals; MI is respectively 54–50, and 61–55. The gap may be due to incomplete sampling of the nest, and since there is no essential structural difference in the mandibles of the large workers, they are not distinctly separated from the mass of workers on the graph, and dimorphism must be considered doubtful.

On and at the base of the Dandenong Ranges, east of Melbourne, this species was found by Mr. John Clark and myself. The nests were under or beside stones in the soil of medium-dry grassy forest dominated by stringybark and other eucalypts, with various wattles and tea-tree forming the lower strata of woody plants. The species has not been found in the adjacent damper white gum forest or wetter fern gullies in this area.

In September and October, colonies were found beneath stones, each in a single flattish chamber. One winter nest was in a crevice in a large stone which split when lifted. By January, the nests had become enlarged to three or more irregular chambers, connected by tenuous galleries, and all but one of these were several inches from the stones in the soil, often among grass roots. The upper chamber immediately beneath the stone usually contains only one or two workers and sometimes a few pupae or large larvae. On very hot, dry days, no individuals were found in this situation, indicating that withdrawal to the lower chambers is probably complete under these conditions.

In winter, nests usually contain 10–40 workers, and one or two dealate females with larvae of middle instars; summer nests contain late larvae and pupae, and at the maturation of the pupae, eggs appear and remain stuck to them in moderate numbers. Winged forms appear at the end of January and early in February; none were found after mid-February in normal seasons. Male pupae take practically the entire month of January to develop to maturity and they remain without pigmentation, other than in the compound eyes, for ten to fourteen days in an artificial nest. A

brood of workers reaches maturity slightly later than the male pupae. No female pupae or winged imagoes have been seen by either Mr. Clark or myself. Females probably are rarer than the males. In the related *O. versicolor*, I have seen two winged females in a mounted series, which lacked males. These facts suggest that the nests may be unisexual. Males are produced in small numbers ; probably rarely more than eight reach maturity. In my artificial nests, male pupae were always eaten by the workers before reaching full pigmentation.

All immature stages develop very slowly both in natural and artificial nests. The eggs take at least a week to hatch. Larvae have been kept in artificial nests, starting as third and fourth instar individuals and ending as unpigmented pupae. Their development was observed for 70 days, from mid-September to early December, and was so slow that it is hard to see how more than one or two broods can be raised in a year in Victoria.

When a nest is opened, the ants move in typically slow and deliberate dacetine fashion, and some individuals curl up and feign death briefly. In spite of the slow pace of the workers, the brood is carried to safer quarters with considerable despatch and efficiency. The larvae and pupae are held by the ends of the jaws, and the basal teeth never seem to be engaged for this purpose. Some of the workers retreat threateningly or stand their ground with jaws open at more than 180°. When closed sharply, the jaws come together with a distinct click. As in all other dacetines studied, retrosalience occasionally occurs as the closing mandibles strike some unyielding surface, but this appears to be accidental. In spite of the threatening attitude, *O. clarki* is a timid insect. The sting does not penetrate the skin of the fingers, and it is not known whether the ants really try to employ it when handled.

Although several nests were carefully searched, no sign of prey was found, but this was probably due to the confused structural situation accompanying the opening of the nests. In one nest, a purposely introduced entomobryid collembolan of large size was snapped at by one worker in the midst of the confusion, but an aphid and a symphylan caused the ants to recoil on contact.

When placed in a glass-topped plaster nest, the ants quickly assembled in part of one chamber and gathered the brood there. The queens tended to remain close to the brood, but wandered on rare occasions, usually when alarmed. Often one worker would crouch quietly with head low, apart from the rest and near or facing the passage leading from the brood chamber. This habit, of a single worker apparently acting as a sentinel, has also been observed in other dacetine genera.

Various small terrestrial arthropods were introduced to parts of the artificial nests, and it soon became apparent that the species was a collembolan feeder. Its attacks on the Collembola appeared calculated and efficient compared with those of Nearctic species of *Smithistruma*. A wide variety of other arthropods were not accepted as food, whether living or dead. Small myriapods, campodeids and spiders caused the ants to recoil violently, while various free living and parasitic mites and

thrips were ignored. Arthropod carcasses were carried as far away from the brood as possible, often to a midden area which also received dead ants and other nest refuse. Among the Collembola offered, Poduroidea were ignored. Only Entomobryoidea were accepted, and among these, Entomobryidae were preferred to Isotomidae. Thus the same prey selectivity of *Strumigenys* and other dacetines (Wilson, 1950; Brown, 1950) occurs in the present species, and also in epopostrumites investigated. This narrow preference is somewhat surprising, and the reason for it is unknown. Entomobryoidea taken by the ants have not been identified beyond the family because of the special apparatus and techniques required.

In stalking, the ants approach the victim only after it has come within 5–10 mm.; often the collembolan runs off and is not caught until several attacks, often by several ants, have been made. Most of the collembolans caught were of very small size compared with the workers of *O. clarki* with their large mandibles, but nevertheless, many struggled for several minutes after being heavily struck. In such cases, the ants usually resorted to their stings, but even this action often did not immediately subdue the springtails. The lingering struggles of the prey are in marked contrast to the rapid cessation of movement in similar collembolan species caught by *Strumigenys perplexa* (Fred. Smith). As soon as the presence of a victim is noticed, the ant turns toward it and immediately assumes a threatening attitude with mandibles open to the utmost. The strike is extremely rapid, and the ant seems neither to lunge forward nor pull backwards in accompaniment. The collembolan is held fast in the tips of the jaws until it ceases struggling or is released for another strike.

In feeding, the workers malaxated the prey and lapped up the juices exuding from the wounds. Usually only one worker would feed from a carcass although other workers might approach and evince what seemed to be rather mild interest, then leave. A feeding worker usually brought the carcass fairly near to the brood. In many hours of watching in full light no prey was seen to be placed very near the larvae which were not observed to feed in the artificial nest. The workers were frequently seen licking the larvae, including the oral region, but high magnification of the proceedings revealed no trophallactic exchange. This state of affairs is probably due to the unnatural surroundings, or too much light. However, larvae of other genera in the tribe were fed directly in the light in artificial nests. It is not impossible that the primitive dacetines practice trophallaxis and that direct feeding is secondary. This can be settled only by further observation.

A queen of *O. clarki* when introduced into an alien nest was accepted without unusual display. She remained near the brood and other queen and behaved like an original inhabitant during the 22 days that the nest was observed. Alien workers of the same species, however, were not accepted without a prolonged struggle, which took the form of a tug-of-war between pairs of individuals, alien and inmate. Sometimes the interlopers died from wounds received, but others were gradually accepted. In fighting, the favourite grip is one with the mandibles fastened to the opponent's postpetiole.

The larvae are very plump in the last two instars. Very little movement is noticed in them except in the mandibles. Observations on this ant will continue when fresh material is secured.

ORECTOGNATHUS MJÖBERGI Forel.

Orectognathus mjöbergi Forel, 1915, Ark. f. Zool., 9, 16, pp. 38–39, pl. 2, figs, 3, 4.

Orectognathus mjöbergi var. *unicolor* Forel, 1915, Ibidem, p. 39.

Worker.—16 specimens, HL, 1·25–1·48 ; ML, 0·75–0·82 ; TL, 5·34–6·33 ; WL, 1·25–1·47 ; CI, 75–80 ; MI, 55–63.

Female.—Probable type of var. *unicolor*, HL, 1·42 ; ML, 0·90 ; TL, 6·36 ; WL, 1·70 ; CI, 70 ; MI, 64. Specimen taken with workers, Tamborine Mt., HL, 1·62 ; ML, 0·97 ; TL, 7·31 ; WL, 1·92 ; CI, 80 ; MI, 60.

In general form and armature, this species is intermediate between *O. clarki* and *O. antennatus*. The mandibles are shorter than in *O. antennatus* ; the narrow lamella of the inner mandibular border is present, but is approximately the same width throughout to near the base ; the subapical portion, if convex, is only feebly so and does not form a distinct flange or low lobe as in *O. antennatus*. The head is narrower than in most specimens of *O. clarki*, and there is no evidence of polymorphism among the workers. The anteocular tooth is low, obtuse and inconspicuous. First gastric tergite with a broad basal zone very finely striate-reticulate, subopaque or weakly shining. Colour deep ferrugineous-brownish, with the gaster concolorous or with a deep reddish-yellow hue. In the workers the spaces between the foveolae on the head and alitrunk and the bottoms of the foveolae themselves are for the most part finely granulose and opaque, but in the females this fine sculpture is mostly absent on the head and the interfoveolar spaces are weakly shining.

Distribution.—The type locality is Cedar Creek, near Ravenshoe, N. E. Queensland (E. Mjöberg). The type has not been seen ; probably deposited in Coll. Forel or Coll. Mjöberg. The type locality of the suppressed var. *unicolor* is Malanda, Queensland (E. Mjöberg) [Coll. Clark*] Other material studied from : Tamborine Mountain, S. E. Queensland (A. M. Lea) ; Malanda, N. E. Queensland (G. F. Hill) ; and Kuranda, N. E. Queensland (F. P. Dodd). Deposition in [MCZ], [Coll. Clark], and [SAM].

Mjöberg took this species in rotten wood. All localities are in rain forest areas, the first in the extreme south-east and the others in the north-east of the State. It is possible that the species is widely distributed in intermediate patches of rain forest.

The female from Malanda seems to be the type of Forel's var. *unicolor*, a form which was proposed in so obscure a fashion that Emery (1922) overlooked it in his listing. A comparison of this specimen and workers from the same locality with a female and workers belonging to *O. mjöbergi* forces suppression of the varietal name. When the variability of the caste in allied species is taken into account, the disparity in dimensions and proportions between the two females is not excessive.

The coloration of the workers varies somewhat from colony to colony.

ORECTOGNATHUS ANTENNATUS Fred. Smith.

Orectognathus antennatus Fred. Smith, 1853, Trans. Ento. Soc. Lond., (Ser. 2), 2, p. 228, pl. 21, fig. 9.

Orectognathus antennctus var. *septentrionalis* Forel, 1910, Rev. Suis. Zool., 18, p. 51.

WORKER.—Ten specimens taken from five colonies at the localities cited, HL, 1·35–1·64 ; ML, 0·79–1·00 ; TL, 5·58–6·74 ; WL, 1·40–1·70 ; CI, 76–80 ; MI, 57–62.

FEMALE.—Two specimens from two colonies from New Zealand, HL, 1·58–1·59 ; ML, 0·91 ; TL, 6·98–7·03 ; WL, 1·81–1·83 ; CI, 81–82 ; MI, 57–59. Holotype of var. *septentrionalis*, HL, 1·62 ; ML, 1·00 ; TL, 7·30 ; WL, 1·82 ; CI, 87 ; MI, 62.

This species may be distinguished by the slender head and mandibles, by the absence of anteocular teeth, which are replaced by slight convexities, and by the distinct, rounded, lobe-like subapical broadening of the feebly sinuous, narrow lamella on the inner mandibular border. Humeral teeth short, not longer than their width at base. Anterior mesonotal tubercles in the form of low welts ; posterior tubercles larger, erect, more or less acute. In worker, teeth of petiolar node obsolete, clearly seen only in dorsal view ; in female, these teeth larger, distinct and acute. Interfoveolar spaces of head, centre of pronotum nearly smooth, shining ; gaster smooth, shining. Pilosity reduced as in *O. versicolor* and *O. clarki*. Colour varying from yellowish to medium ferruginous, the vertex, nodes, and middle of gastric dorsum weakly infuscated in darker specimens. Female usually darker than accompanying workers ; alitrunk often weakly infuscated.

MALE.—(From Waikino, New Zealand), HL, 0·87 ; TL, 5·4 ; head width including eyes, 0·96 ; WL, 1·72.

Mandibles very slightly larger and cervical collar more pronounced than in male of *O. clarki*. Antennae slender, third to twelfth segments three to four times as long as broad ; apical segment (length ca. 0·45) over twice as long as scape. Sculpture more pronounced than in male of *O. clarki* ; nodes and first gastric tergite coriaceous, sparsely foveolo-punctate, faintly shining. Pilosity of head whitish, more abundant and conspicuous than in male of *O. clarki* and with a slightly woolly appearance. Colour black, nodes and gaster blackish-brown ; mandibles, legs and genitalia ferrugineous-yellow ; antennae ferrugineous.

DISTRIBUTION.—The type locality is New Zealand [BMNH]. The locality for the type of the suppressed variety *septentrionalis*, a dealate female, is Wollongbar, Richmond River, New South Wales (W. W. Froggatt) [Coll. Clark]. Other material from the following localities :— New Zealand : Without precise locality, one dealate female (Swezey) ; Waikino, Auckland, three workers, one dealate female and one male ; Titirangi, two workers (E. S. Gourlay). New South Wales : Dorrigo, two workers (W. M. Wheeler) ; Salisbury, one worker (P. J. Darlington). Victoria : Millgrove, two workers (J. E. Dixon). Deposition in [MCZ] and [Coll. Clark].

This ant has been collected in abundance only in N. E. New South Wales and in New Zealand around Auckland. I suspect it is an importation into the latter region. The locality in Victoria is surprising in view of the concentration of the localities in New South Wales.

Forel's separation of a variety, based on a single female, is not borne out by comparison of the specimen with Australian and New Zealand material. The variation in female head width is similar to that observed in *O. versicolor*, *O. clarki* and *O. mjöbergi*. New Zealand workers have on the average shorter mandibles than those of Australian specimens, but this difference is not significant when possible error of measurement and the small size of the samples are considered. There is no difference in colour.

ORECTOGNATHUS HOWENSIS Wheeler.

Orectognathus antennatus var. *howensis* Wheeler, 1927, Proc. Amer. Acad. Arts Sci., 62, pp. 145-146, fig. 7.

Wheeler described this form from a single worker collected by A. M. Lea on Lord Howe Island. The specimen [SAM] has unfortunately lost the head since description, and no further material has been collected.

Wheeler's characterization and figure indicate that specific status is warranted. The lamella of the inner mandibular border is expanded subapically as a low, subacutely-pointed toothlike process, and not as a rounded lobe as in *O. antennatus*. A somewhat similar process is described and figured by Szabó (1926) for *O. csikii*. Otherwise *O. howensis* seems to be very similar to *O. antennatus*. Wheeler's measurement of length (5mm.) seems too low. The possibility exists that this species has been carried as a tramp from Australia or New Guinea.

ORECTOGNATHUS CSIKII Szabó.

Orectognatus csikii Szabó, 1926, Ann. Mus. Nat. Hung., 24, pp. 350–351, figs. A, a.

Distribution.—The type locality is Erima, Astrolabe Bay, New Guinea (Biró, 1897), [MNH]. An additional New Guinea locality is Marega (L. Biró, 1901), found in rotten wood.

As indicated in Szabó's figures, the ant is similar in habitus to small workers of *O. versicolor* or *O. mjöbergi*, with estimated CI ca. 88 and MI ca. 74. Mandibles slender, each with a low, subacutely-pointed toothlike process or lamella on the subapical portion of the inner mandibular border. Anteocular teeth small, more or less acute; a small raised pair of teeth on the vertex. Humeral teeth large, flattened-subspiniform and acute at the tips, similar to those of *O. mjöbergi*. Mesonotum raised slightly above the pronotum; the anterior mesonotal welts indistinct or absent, but posterior pair well developed, acute. Petiolar node with a well developed pair of teeth.

The species has not been reported since the time of its description.

ORECTOGNATHUS SARASINI Emery.

Orectognathus sarasini Emery, 191-, in Sarasin and Roux, Nova Caledonia, Zoologie, 1, (4), pp. 416–417.

Orectognathus antennatus var. *sarasini* Wheeler, 1927, Proc. Amer. Acad. Arts Sci., 62, pp. 125, 146.

Distribution.—Known only from the type locality—Mt. Canala, 650 M., New Caledonia. Part of the type series probably is deposited in Coll. Emery.

Emery (1914) stated specimens of *O. sarasini* smaller than *O. antennatus* ("L. with mandibles 4·2–4·6 mm."), with similar but more slender mandibles. In the original description of *O. mjöbergi*, Forel stated that the species was "much larger than *sarasini*," but gave the length with mandibles of the *O. mjöbergi* worker as only 4·4–4·6 mm. This gives some indication of the difficulty of interpretation of measurements made by former authors.

As additional characters distinguishing the species from *O. antennatus*, Emery cites the more acute and prominently projecting anterior mesonotal tubercles; the longer, more slender propodeal spines; the small indistinct denticles of the petiolar summit, and the sculpture which is "much more feeble, the punctures more widely spaced, so that the insect is much more shining." The dorsal surface of the propodeum is polished, with some well-spaced umbilicate punctures; petiole and postpetiole superficially reticulate.

The species must be regarded on the published evidence as distinct from *O. antennatus*. Wheeler never handled any New Caledonia specimens of the genus.

ORECTOGNATHUS SEXSPINOSUS Forel.

Orectognathus sexspinosus Forel, 1915, Ark. f. Zool., 9, 16, pp. 39–41, Pl. 2, figs. 1, 2.

WORKER.—One cotype, HL, 1·17; ML, 0·85; TL, 5·15; WL, 1·24; CI, 74; MI, 73.

This species is very distinct from its congeners. The body is extremely slender, especially the petiole and mandibles. Anteocular teeth acute but small. Inner mandibular border feebly convex near the basal third and again before the apex. Dorsal apical tooth about three times as long as the ventral fork and relatively more slender. The antennal scapes reach the occipital extremities. Humeral teeth longer than in any other species, slender and spiniform, anteriorly curved. Anterior mesonotal tubercles obsolete, posterior mesonotal tubercles erect, acutely spiniform. Petiole exceedingly elongate, with a very narrow, low, dorsally convex node with no trace of denticles on the summit. Body smooth and shining, the widely scattered foveolae small and few. Body and appendages with abundant delicate short erect hairs, evenly distributed. Colour, bright ferrugineous-yellow with whitish legs and mandibles; the femora and tibiae infuscated next to the articulations.

MALE.—Distinguished by the pilosity, similar to that of the worker, and by the short scape, "scarcely 1½ times longer than thick." Wing venation and genitalia unknown.

DISTRIBUTION.—Known only from the type series from Cedar Creek, near Ravenshoe, N. E. Queensland (E. Mjöberg). Deposition [Coll. Forel], [Coll. Mjöberg], one cotype [Coll. Clark*]. The ant was taken in rotten wood in rain forest.

ORECTOGNATHUS SATAN sp. nov.

Figure 3.

Worker.—Holotype, HL, 1·48 ; ML, 0·98 ; TL, 6·19 ; WL, 1·60 ; CI, 61 ; MI, 66 ; antennal scape 1·00 ; distal segments 0·12, 0·60, 0·20, 0·49 (total 1·41).

Head very long, narrow, narrowing slightly anteriorly ; width of clypeus about three-fifths that across occipital lobes. Vertex raised, convex, with two very feeble subsulciform impressions, one running transversely from eye to eye, the other posteromedian and longitudinal. Posterodorsal margins of occipital lobes each produced as a stout acute, dorsally-curved tooth. Occipital excision deep ; entire occiput depressed ; dorsum of the occipital lobes weakly concave. Sides of head anterior to eyes feebly concave ; frontal area very small, impressed ; clypeus impressed anteromedially and with a feeble median emargination of its anterior border. Frontal carinae weak, only feebly convex in the anteocular position, becoming obsolescent dorsally and posteriorly to eyes. Antennal scrobes very feebly indicated, especially behind eyes. Eyes long-oval, convex, 0·24mm. in greatest diameter, situated on ventral limits of scrobes with their posterior borders slightly anterior to mid-length of head.

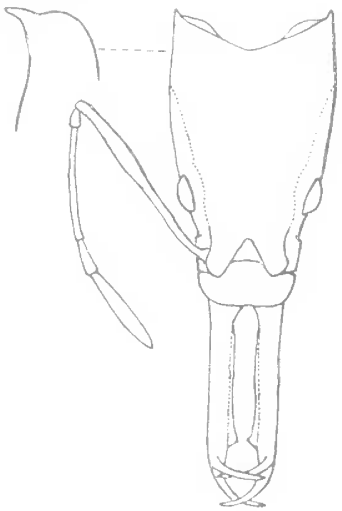

Figure 3. *Orectognathus satan* sp. nov.
Worker, dorsal view of head and mandibles and (inset) lateral view of left occipital region.

Mandibles straight and slender ; inner margins nearly straight, very narrow, lamelliform, expanded gradually apicad, forming a blunt toothlike process bounded by a preapical excision. Apical teeth slender, curved, spiniform, the separate dorsal tooth 0·24m.n., dorsalmost of ventral pair 0·19mm., ventralmost 0·11mm. long. Antennae very slender ; scapes feebly sigmoidal, slightly fusiform-incrassate in apical half, failing to reach the apices of occipital teeth by about one-fifth their own length. Funiculus slender ; the pedicel slightly thickened ; the second segment slender, feebly curved ; apical segment incrassate.

Pronotum flat, submarginate, with low, subrectangular humeral teeth. Mesonotum gently elevated, with four low, rounded tumuli, the anterior pair slightly the more prominent. Metanotal groove deeply impressed, partly bridged by short longitudinal costulae in the bottom. Propodeal dorsum longer than broad, transversely convex ; longitudinally, only slightly convex anteriorly. Propodeal spines extremely long, slender, acute, elevated at an approximate angle of 45°, diverging at an angle of 55° ; extremely feebly curved mesad, tips feebly deflected ventrad ; 0·74mm. long

from centres of longitudinally costulate bases; distance between centres of bases 0·18mm. Propodeal declivity feebly concave, bordered ventrolaterally by a round translucent flange. Bulla of metapleural gland with carinula shaped posteriorly like a reversed L.

Petiole very long, slender (0·80mm. in dorsal view), gradually rising and thickening posteriorly; node consisting almost entirely of two heavy, subconical, posteriorly-directed dorsolateral teeth. Postpetiole bun-shaped, much broader than the petiolar node, slightly broader than long, greatest width 0·38mm., slightly narrowed posteriorly. Gaster as usual for the genus. Legs long, slender; femora incrassate in distal halves.

Head and alitrunk covered with small foveolae; the intervening spaces narrow, forming oblique costulae on the dorsal surfaces of the occipital lobes. Other interfoveolar spaces, afoveolate median patches on the posterior vertex, anterior pronotum, anterior propodeal dorsum, petiole, coxae, legs and bases of mandibles coriaceous, subopaque to moderately shining. Dorsum of postpetiole nearly smooth, shining. Mandibles and antennae feebly punctate, shining, the latter only weakly so; sides of alitrunk irregularly and coarsely punctate-rugulose, with limited shining areas; gaster and propodeal declivity smooth, shining; clypeus and much of petiolar node finely coriaceous, opaque, with scattered feeble foveolae.

Inner ventral mandibular surfaces and gastric apex with a few fine erect hairs; antennae, legs, gastric apex and underside of head, with very fine, short, sparsely distributed, adpressed pubescence. Trigger hairs of labrum short, slightly longer than the width of a mandible, strongly diverging.

Colour, including that of coxae, rich reddish-ferrugineous, with occipital lobes slightly lighter and gaster slightly darker. Prothoracic legs pale straw-coloured with light ferrugineous articulations; other legs and antennae yellowish-ferrugineous.

Measurements of the eight paratypes, HL, 1·41–1·52; ML, 0·94–1·00; TL, 5·75–6·37; WL, 1·46–1·61; CI, 58–61; MI, 66–67. Very similar to the holotype; the propodeal spines of several specimens are quite straight viewed from above; angle of spinal divergence 50°–60°.

Female.—Dealate, HL, 1·52; ML, 0·98; TL, 6·47; WL, 1·62; CI, 62; MI, 65.

Like the worker; with the usual sexual differences, weak compared to those in other species of the genus. Pronotum shallowly impressed in middle. Mesonotum rather weakly developed, with broad longitudinal sulcus; anterior tumuli distinct, posterior pair (prescutellar lobes) developed as small, erect rounded flanges above the wing insertions; scutellum depressed, nearly flat. Wing stumps black; ocelli small but distinct. Postpetiole with dorsal foveolae more distinct than in the worker; gaster slightly larger, mahogany in colour.

Distribution.—Malanda Falls, Malanda, N. E. Queensland, at 2,400 feet, W. L. Brown, 8th November, 1950. Deposition, holotype and female [MCZ], paratypes [Coll. Clark], [MCZ], [SAM], [QM.], [Coll. McAreavey], [USNM].

These 10 individuals were found huddled, practically motionless, with a few larvae in a small, elongate cell (about 25 x 7 x 7mm.) in the heart of a large, moist, rotten log lying on the floor of the rain forest near the creek. A narrow passage about 25mm. long led obliquely downward from the end of the inhabitated cell to a shorter uninhabitated cell with clean floor and walls. No other chambers were seen, but small crevices connected the second cell with anastomosing cavities made by borers and other insects. The cells contained no remains of prey. Apparently the ants were in a state of aestivation, a very thorough search of the log revealing no other workers. When disturbed, some ants moved very slowly away with larvae, while others remained still. This s pecies mayprey on the medium-sized *Paronellides* and similar long-antennate entomobryids which are found in rotten logs in the Queensland rain forests.

Superficially this species seems to be closely related to *Arnoldidris horvathi* (Szabó) because of the dentate occipital lobes and the very long propodeal spines. However, the form of the pronotum and mesonotum, the petiole and postpetiole, the subapical mandibular process, and the sculpture point to placement in *Orectognathus*. Apparently the closest species is *O. antennatus*, but it differs markedly from this and other species of the genus in the form of the head and in numerous other features. The head shape and somewhat reduced humeral teeth may be indications that *O. satan* is close to the stock which gave rise to *Arnoldidris*, or alternatively the similarity of the heads of *O. satan* and *A. horvathi* may be due to convergence.

KEY TO THE SPECIES OF *ORECTOGNATHUS*, BASED ON THE WORKERS.

1. Each occipital lobe posteriorly produced as a stout, acute, dorsally-curving tooth ..... *satan*, new species

   Occipital lobes bluntly rounded posteriorly, without teeth 2

2. Propodeal spines about three times as long as the distance between the centres of their bases; body and limbs with abundant and generally-distributed fine, short erect pilosity; petiolar node very slender, unarmed..... *sexspinosus* Forel

   Propodeal spines decidedly less than three times as long as the distance between the centres of their bases; without generally-distributed erect pilosity or else the petiolar node bidentate, or both..... 3

3. Inner mandibular border with a low, subacutely pointed tooth or lamella just basad of the apical fork 4

   Inner mandibular border without subapical armature or else with a low rounded subapical flange or convexity..... 5

4. Small bilaterally-paired acute teeth present in front of eyes on vertex, and on summit of petiolar node; with generally distributed erect pilosity..... *csikii* Szabó

   Anteocular teeth and teeth of vertex obsolete; petiolar teeth nearly so; erect hairs confined to mandibles and gastric apex..... *howensis* Wheeler

5. Monomorphic; anteocular teeth very low and obtuse or altogether lacking; head narrower, CI, 75–80..... 6

   Polymorphic; anteocular teeth present, usually strong, rectangular or acute; head broader, CI, 79–97, rarely under 81..... 7

6. Lamellate margin of inner mandibular border with a strong, rounded subapical expansion; anteocular teeth each represented only by a slight convexity..... *antennatus* F. Smith

   Lamellate margin of inner mandibular border narrow throughout, not or scarcely expanded subapically; anteocular teeth present, obtuse..... *mjöbergi* Forel

7. Inner mandibular borders approximately straight along basal two-thirds; dimorphic, with large-headed, broad-jawed soldier caste as well as "normal" workers ..... *versicolor* Donisthorpe

   Inner mandibular borders shallowly but distinctly concave along basal two-thirds; unimodally polymorphic, without distinct soldier caste having different mandibles ..... *clarki* sp. nov.

O. sarasini Emery is not included in this key owing to insufficient knowledge of its characteristics.

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